



## SEQUENCE LISTING

<110> Pizza, Mariagrazia  
Giuliani, Marzia M  
Rappuoli, Rino

<120> IMMUNOGENIC DETOXIFIED MUTANT E. COLI LT-A-TOXIN

<130> 2302-0342.10

<140> 09/528,682

<141> 2000-03-20

<150> PCT/IB97/01440

<151> 1997-10-30

<150> 09/297,171

<151> 1999-04-27

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<170> PatentIn Ver. 2.0

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<211> 240

<212> PRT

<213> Escherichia coli

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Lys Arg Ser Gly Gly Leu Met Pro Arg Gly His Asn Glu Tyr Phe Asp  
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Arg Gly Thr Gln Met Asn Ile Asn Leu Tyr Asp His Ala Arg Gly Thr  
35 40 45

Gln Thr Gly Phe Val Arg Tyr Asp Asp Gly Tyr Val Ser Thr Ser Leu  
50 55 60

Ser Leu Arg Ser Ala His Leu Ala Gly Gln Ser Ile Leu Ser Gly Tyr  
65 70 75 80

Ser Thr Tyr Tyr Ile Tyr Val Ile Ala Thr Ala Pro Asn Met Phe Asn  
85 90 95

Val Asn Asp Val Leu Gly Val Tyr Ser Pro His Pro Tyr Glu Gln Glu  
100 105 110

Val Ser Ala Leu Gly Gly Ile Pro Tyr Ser Gln Ile Tyr Gly Trp Tyr  
115 120 125

Arg Val Asn Phe Gly Val Ile Asp Glu Arg Leu His Arg Asn Arg Glu  
130 135 140

Tyr Arg Asp Arg Tyr Tyr Arg Asn Leu Asn Ile Ala Pro Ala Glu Asp

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Gly Tyr Arg Leu	Ala Gly Phe Pro Pro Asp His Gln Ala Trp Arg Glu					
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Glu Pro Trp Ile	His His Ala Pro Gln Gly Cys Gly Asn Ser Ser Arg					
	180		185		190	
Thr Ile Thr Gly Asp Thr Cys Asn Glu Glu Thr Gln Asn Leu Ser Thr						
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Ile Tyr Leu Arg Glu Tyr Gln Ser Lys Val Lys Arg Gln Ile Phe Ser						
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<210> 3  
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 Asp Gly Arg Tyr Ser Asn Phe Ala Leu Ile Ser Ala Glu Gly Gly Met  
 35 40 45  
 Gln Asp Gly Asp Leu Phe Gly Thr Val Asn Gln Ser Asn Phe Pro Met  
 50 55 60  
 Ser Thr Phe Glu Gln Val Pro Asn Asn Lys Glu Phe Lys Gly Val Ile  
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 Ser Ala Asn Val Lys Tyr Asp Met Asn Phe Lys Lys Leu Leu Arg Phe  
 85 90 95  
 Met Glu Asp Asp Phe Ile Gly Val His Gly Glu  
 100 105

<210> 4  
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<212> PRT  
<213> Escherichia coli

<400> 4  
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20 25 30  
Asp Gly Arg Tyr Ser Asn Tyr Ala Leu Ile Ser Ala Glu Gly Gly Met  
35 40 45  
Asp Arg Asp Leu Phe Gly Ser Ala Asn Ile Asp Gly Phe Pro Glu Val  
50 55 60  
Arg Glu Phe Asn Ser Leu Pro Asn Asn Lys Ala Ser Ser Asp Thr Ala  
65 70 75 80  
Ser Leu Asn Lys Gln His Asp Ala Asp Phe Lys Lys Tyr Ile Lys Leu  
85 90 95  
Leu Ile Asn Asn Asp Gly Phe Phe Ser Asn Asn Gly Gly Lys  
100 105 110

<210> 5  
<211> 240  
<212> PRT  
<213> Escherichia coli

<400> 5  
Asn Gly Asp Arg Leu Tyr Arg Ala Asp Ser Arg Pro Pro Asp Glu Ile  
1 5 10 15  
Lys Arg Ser Gly Gly Leu Met Pro Arg Gly His Asn Glu Tyr Phe Asp  
20 25 30  
Arg Gly Thr Gln Met Asn Ile Asn Leu Tyr Asp His Ala Arg Gly Thr  
35 40 45  
Gln Thr Gly Phe Val Arg Tyr Asp Asp Gly Tyr Val Ser Thr Ser Leu  
50 55 60  
Ser Leu Arg Ser Ala His Leu Ala Gly Gln Ser Ile Leu Ser Gly Tyr  
65 70 75 80  
Ser Thr Tyr Tyr Ile Tyr Val Ile Ala Thr Ala Pro Asn Met Phe Asn  
85 90 95  
Val Asn Asp Val Leu Gly Val Tyr Ser Pro His Pro Tyr Glu Gln Lys  
100 105 110

Val	Ser	Ala	Leu	Gly	Gly	Ile	Pro	Tyr	Ser	Gln	Ile	Tyr	Gly	Trp	Tyr	115	120	125
Arg	Val	Asn	Phe	Gly	Val	Ile	Asp	Glu	Arg	Leu	His	Gly	Asn	Arg	Glu	130	135	140
Tyr	Arg	Asp	Arg	Tyr	Tyr	Arg	Asn	Leu	Asn	Ile	Ala	Pro	Ala	Glu	Asp	145	150	155
Gly	Tyr	Arg	Leu	Ala	Gly	Phe	Pro	Pro	Asp	His	Gln	Ala	Trp	Arg	Glu	165	170	175
Glu	Pro	Trp	Ile	His	His	Ala	Pro	Gln	Gly	Cys	Gly	Asn	Ser	Ser	Arg	180	185	190
Thr	Ile	Thr	Gly	Asp	Thr	Cys	Asn	Glu	Glu	Thr	Gln	Asn	Leu	Ser	Thr	195	200	205
Ile	Tyr	Leu	Arg	Glu	Tyr	Gln	Ser	Lys	Val	Lys	Arg	Gln	Ile	Phe	Ser	210	215	220
Asp	Tyr	Gln	Ser	Glu	Val	Asp	Ile	Tyr	Asn	Arg	Ile	Arg	Asp	Glu	Leu	225	230	235